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## Fungicides: QoI fungicides

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# INTEGRATED CROP MANAGEMENT

## Fungicides: QoI fungicides

*Second in a series. See [Part 1](#) [1].*

Quinone outside inhibitor (QoI) fungicides include three fungicide families, the well-known family of strobilurins and two new families, represented by fenamidone and famoxadone. QoI fungicides approved for, or in review for, use on field crops in Iowa include strobilurins azoxystrobin, pyraclostrobin and trifloxystrobin, and famoxadone.

These fungicides are used on cereal grains, corn, and soybean as well as many other crops in Iowa, such as fruit trees, small fruit, vegetables, and turf. Strobilurins were derived from a naturally occurring compound found in wood-rotting fungi. Fenamidone and famoxadone are synthetic fungicides. These compounds are very effective on a broad spectrum of fungi. The anti-fungal activity of QoI fungicides is different from other fungicides on the market.

### How do they inhibit fungi?

QoI fungicides are chemical compounds that act at the Quinol outer binding site of the cytochrome bc<sub>1</sub> complex. In other words, these fungicides act by inhibiting fungal mitochondrial respiration that stops energy production in the fungus and results in its death.

### When should QoI fungicides be applied?

This group of fungicides should be applied preventively or as early as possible in the disease cycle. They are effective against spore germination and early mycelium growth. Once the fungus is growing inside the leaf tissue, QoI fungicides have little or no effect.

### Where do QoI fungicides move in the plant and how long do they last?

Most QoI fungicides are locally systemic. They are absorbed into leaf tissue. If a droplet of fungicide is applied to the top surface of a leaf, it will spread out on the surface of the leaf and even move to the cuticle on the other side of the leaf. A few of these fungicides are upwardly systemic and move up the plant in the xylem. Additionally, some may move as a gas above the leaf and readily rebind to the waxy cuticle. Most have a residual period of approximately 21 days.

### Do we worry about fungicide resistance?

Yes, since QoI fungicides are active only at one specific site in fungal pathogens, they are

prone to resistance. To date there have been 23 different plant pathogens that have some level of resistance to Qol fungicides. This resistance is a result of single gene mutations in the fungi.

## **Recommendations for avoiding fungicide resistance:**

- Tank mix Qol fungicides with fungicides that have a different mode of action. The other fungicide has to provide effective disease control. Refer to label recommendations for rates.
- Apply a maximum of two Qol fungicide-containing sprays per season.
- Apply Qol fungicides according to manufacturers' recommendations for the target disease at the specific crop growth stage indicated.
- Apply the Qol fungicide preventively or as early as possible in the disease cycle. Do not rely on management of diseases when Qol fungicides are applied during early infection.
- Reduced rate programs accelerate the development of resistant populations and therefore must not be used.

*Continue to Part 3 [2].*

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